risk of TM by hormone receptor status adjusting for age. **RESULTS:** Among the 86255 women with invasive breast cancer, 38621 (45%) underwent TM, 10261 (12%) were Her2 positive, and 9512 (11%) were Black. For Black women with T1 tumors, after adjusting for age, the odds of TM were 1.3 (95% CI 1.1, 1.6) times higher for estrogen receptor (ER)(+) and Her2(+) tumors compared to women who were ER(+) Her2(-), 1.4 (95% CI 1.1, 1.8) times higher for ER(+)Her2(+) compared to ER(-)Her2(-), and 1.4 (95% CI 1.0, 1.8) times higher for ER(-)Her2(+) compared to ER(-)Her2(-). For White women with T1 tumors, after adjusting for age, the odds of TM were 1.4 (95% CI 1.3, 1.5) times higher for ER(+)Her2(+) compared to ER(+)Her2(-), 1.1 (95% CI 1.0, 1.2) times higher for ER(+) Her2(+) compared to ER(-)Her2(-), and 1.7 (95% CI 1.5, 1.9) times higher for ER(-)Her2(+) compared to ER(-)Her2(-). Similar Results were seen for stage T2 tumors. **CONCLUSIONS:** For both Black and White women with early stage tumors, Her2 positivity predicts TM. Further research should investigate the role of Her2 positivity in influencing the surgical decision-making of early stage breast cancer patients.

HM3

A REVIEW OF THE LITERATURE REGARDING BIOSIMILARS: WHAT IS THE EVIDENCE FOR EQUIVALENCE?

Raisch DW[1], Chen C[2], Tuenter H[3], Bennett C[4], IJzerman MJ[5]

[1]*University of New Mexico, Albuquerque, NM, USA,* [2]*University of New Mexico College of Pharmacy, Albuquerque, NM, USA,* [3]*University of Twente, Enschede, The Netherlands,* [4]*University of South Carolina College of Pharmacy, Columbia, SC, USA,* [5]*University of Twente and MIRA Institute for Biomedical Technology & Technical Medicine, Enschede, The Netherlands*

OBJECTIVES: Although European Medicines Association approved 21 biosimilars from 2007-2014; the Food and Drug Administration approved its first, filgrastim, in 2014. Regulatory approvals require pharmacokinetic/pharmacodynamic studies and efficacy/safety trials with fewer patients and shorter durations than for reference biologicals. Cost savings are 20%-30%. However, uptake of biosimilars may be delayed since clinicians and decision makers may have concerns about clinically-relevant differences in effectiveness, safety, and/or immunogenicity. Therefore, our objective was to review published literature regarding studies of effectiveness, safety, immunogenicity, and costs of biosimilars versus reference biologicals. **METHODS:** We searched electronic databases using the term "biosimilar pharmaceuticals" as a major topic, with filters for English language and human species. Our inclusion criteria were: study design for comparison of biosimilars and data included in Results. We excluded editorials, in vitro studies, and descriptive summaries. **RESULTS:** We identified 174 articles. Inclusion/exclusion criteria left 19 equivalence studies for the following: epoetins (n=4, 21.1%), filgrastims (n=10, 52.6%), monoclonal antibodies (MABs) (n=2, 10.5%), tumor necrosis factor blockers and MABs (n=1, 5.3%), and interferon (n=2, 10.5%). The median sample size was 104, but there were 3 large studies (n=6177, n=904, n=606). Fifteen studies (79.0%) reported comparative effectiveness. Most studies also reported on safety (n=12, 63.2%), immunogenicity (n=6, 33.6%), and/or costs (n=3, 15.8%). Cost studies included a budget impact model regarding potential savings from adopting biosimilars versus reference biologics for rheumatic disease, a model of cost savings comparing biosimilar versus reference epoetins, and a survey of uptake and associated cost savings from various biosimilar filgrastims across European Union countries. **CONCLUSIONS:** Most current published data on biosimilar equivalence focus primarily on effectiveness, evaluate relatively small numbers of patients, and report minimal data on safety, immunogenicity, or cost savings. To increase uptake, biosimilar manufacturers and regulators should consider conducting post-marketing surveillance research to provide additional data on safety, immunogenicity and costs.

HM4

HOW MUCH EVIDENCE DO WE NEED BEFORE IMPLEMENTING PHARMACOGENOMIC TESTING IN THE CLINIC?

Guzauskas GF, Serbin M, Veenstra DL

University of Washington, Seattle, WA, USA

OBJECTIVES: Consensus on the evidence required to recommend clinical pharmacogenomic testing is unclear. A formal assessment of pharmacogenomic evidence levels in relation to other clinical interventions, such as avoiding drug-drug interactions (DDI), may be helpful for policymakers. The objective of this study was to quantitatively compare the evidence levels of two contested drug-attenuating interactions with clopidogrel antiplatelet therapy, and assess the value of obtaining additional evidence to inform clinical practice guidelines. **METHODS:** We developed analogous value of information (VOI) decision models for: (1) avoidance of proton pump inhibitors (PPIs) in clopidogrel patients, and (2) pharmacogenomic-guided antiplatelet selection, both versus no intervention. Interaction-specific parameters and model structures were the only dissimilarities. We calculated the expected value of obtaining perfect information (EVPI) per patient, and the expected population value of obtaining additional information through future studies (EVSI). **RESULTS:** Current evidence for interaction-1 was slightly less uncertain (a 20% probability of making a non-optimal recommendation) than for interaction-2 (23%). The relative risk for cardiovascular death (conferred by concomitant PPI use in interaction-1, and reduced-function CYP2C19 alleles in interaction-2) was the greatest source of uncertainty in both models. The expected value of perfect information for interaction-1 was $139 per patient, compared to $242 per patient for interaction-2. In simulated 10,000-patient clinical trials, the expected population value of future research for interaction-1 was $2 million, versus $110 million for interaction-2. **CONCLUSIONS:** The evidence levels for clopidogrel DDI and pharmacogenomic effects appear to be fairly similar. However, the value of conducting future research on clopidogrel pharmacogenomics is higher because of greater uncertainty about the impact of pharmacogenomic testing on cardiovascular mortality. Our findings imply that evidence-based clinical guidelines for DDI and pharmacogenomic effects should be generally similar with regard to direction and strength of recommendation. This contrasts to some degree with current guidelines and drug labeling.

MEDICATION ADHERENCE STUDIES

MA1

IMPACT OF A PHARMACIST MEDICATION ADHERENCE CONSULTATION PROGRAM ON HEALTH CARE COSTS AND RISK OF HOSPITALIZATION

Wade RL[1], Hill JW[1], Akinbosoye O[2], Jiang Z[2], Mu Y[2], Sun K[1], Karkare S[3], Taitel MS[2]

[1]*IMS Health, Plymouth Meeting, PA, USA,* [2]*Walgreen Co., Deerfield, IL, USA,* [3]*IMS Health, Deerfield, IL, USA*

OBJECTIVES: Non-adherence is associated with poorer health outcomes and increased costs. This study evaluated the impact of a community pharmacist medication adherence consultation on health care costs and the risk of hospitalization. **METHODS:** Patients initiating therapy within 16 drug classes were offered face-to-face or telephonic consultations by a Walgreens pharmacist between 2/7/2013 – 10/6/2013. Consultation included motivational interviewing focused on fitting medication-taking behavior into patients' daily routine, and removing barriers to adherence. Patients were assigned to two groups according to the intensity of consultation: no consultations (NC) and ≥ 1 consultations received (CR). Patients were linked deterministically to the IMS Health PharMetrics Plus database such that 6 months of pharmacy and medical claims data pre and post their index date could be analyzed. Cost differences from the pre to post-index periods were compared between NC and CR groups, using difference in differences estimation in a GLM model, controlling for demographic and clinical confounders. **RESULTS:** CR patients (n=58,449) and NC patients (n=53,870) had similar age (48.2 vs. 47.7 years), gender (59.0% vs. 57.7% female) and disease burden (0.61 vs. 0.58 for Charlson Comorbidity Index, CCI). CR patients incurred significantly lower pre- to post-index GLM-adjusted total health care costs (-$266/-4.3% lower, p=0.001), comprised of lower inpatient (-$231, p=0.009), lower pharmacy (-$43, p<0.0001), and similar outpatient costs (-$36, p=0.279); and had a lower probability of hospitalization (OR: 0.92, 95% CI: 0.86, 0.98, p=0.009). CR patients with a CCI equal to 1-2 realized the greatest cost savings (-$688, p=0.001) compared to patients with CCI=0 (-$106, p=0.051), and CCI≥3 ($575, p=0.293). **CONCLUSIONS:** Patients receiving structured pharmacist consultations focused on improving medication adherence were shown to have significantly lower health care costs and risk of hospitalization. Ongoing studies will explore underlying relationships between program participation, adherence, and impact on health outcomes and costs.

MA2

COST OF NON-ADHERENCE TO MEDICATION IN A POST-MI POPULATION

Garrido E[1], Arnold RJ[1], Bansilal S[2], Castellano JM[2], Wei HG[3], Freeman A[4], Garcia-Alonso F[5], Espinosa C[5], Lizano I[5], Spettell C[4], Steinberg G[3], Fuster V[2]

[1]*Icahn School of Medicine at Mount Sinai, New York, NY, USA,* [2]*The Mount Sinai Medical Center, New York, NY, USA,* [3]*Aetna, New York, NY, USA,* [4]*Aetna, Data Science, Hartford, CT, USA,* [5]*Ferrer, Barcelona, Spain*

OBJECTIVES: We have previously demonstrated that full adherence with ACE-Inhibitors (ACEI) or statins in a post-myocardial infarction (MI) population is associated with lower rate of cardiovascular (CV) events compared to partial- or non-adherence. Herein, we sought to determine the direct medical costs attributable to partial- and non- adherence to these therapies. **METHODS:** Data on CV events and resource utilization were collected through a retrospective, nested cohort study in a large US insurer database. We also analyzed two national files for physician and non-physician unit cost weighted averages of CV events (stroke, MI, atherosclerosis or angina), procedures (revascularization and CV tests) and visits (emergency room and outpatient CV visits). We estimated per person cost differences between adherence groups and the sensitivity of the Results using weighted and unweighted averages. A third-party payer economic perspective was adopted; all costs were expressed in 2014$. **RESULTS:** The estimated per patient weighted average annual cumulative medical costs were $5,153 for adherent, $6,470 for partially-adherent and $6,767 for non-adherent patients. This difference was mainly driven by a lower rate of CV events and revascularizations for adherent patients. Applying referenced unweighted averages, we estimated that the MI reference unit cost was $4,325 higher than the weighted average cost (p<0.001); the CV test unit cost was $1,010 higher than the weighted average cost (p=0.001). Using national prevalence data for incident MIs and medication adherence, we project that full adherence may lead to annual savings of $98.2 million and $100.9 million over partial- and non-adherence, respectively. **CONCLUSIONS:** Full adherence to statins and ACEI was associated with reduced per patient monthly direct medical costs of $109.7 and $134.4 over partial- and non-adherence. Using unweighted, rather than weighted, averages overestimated the economic impact, indicating the importance of data type in such analyses. Full adherence to guideline-recommended therapies has tremendous cost-saving implications.

MA3

THE EFFECT OF COST-RELATED MEDICATION NONADHERENCE ON THE DECISION OF TAKING UP MEDICARE PART D AMONG ELDERLY MEDICARE BENEFICIARIES

Han Y, Balkrishna R

University of Michigan, Ann Arbor, MI, USA

BACKGROUND: The sizable fraction of the elderly adults who are left without Part D coverage indicates there are potential barriers in taking up Part D, including information barriers and economical barriers. Few studies have examined how cost-related medication nonadherence (CRN) affected the willingness of taking up Part D among elderly adults using national representative data. **OBJECTIVES:** To estimate the impact of self-reported CRN on the decision of taking up Medicare Part D among Medicare beneficiaries age 65 and above who did not have Part D coverage in 2006 incorporating the effect of complex sample survey design. **METHODS:** This retrospective cross-sectional study used data from the 2006 Health and Retirement Study database (2006 HRS). Information on patient demographics, social and economic factors and health insurance coverage were obtained by survey. The dual-eligible beneficiaries were excluded due to automatically enrollment. A total of 5,826 eligible

cases were recruited in our study. **RESULTS:** The majority of the eligible Medicare beneficiaries responded "not at all likely" to take Part D (62%), and significant proportions also reported "not too likely" to take Part D (21.46%), while few of them reported "somewhat likely"(9.44%) and "Very likely"(6.31%). Results of weighted cumulative logit regression indicated that people who had cost barriers in medication use were significantly more likely to take up Medicare Part D (OR=2.62, 95% CI[2.00, 3.44], p<0.001). Males and older adults were less likely to take up Medicare Part D (OR=0.83, 95% CI[0.74, 0.94] and OR=0.98, 95% CI[0.97, 1.00], p<0.01). **CONCLUSIONS:** Results of this study indicated experiencing CRD was significantly associated with the probability of taking up Part D. CRN could be a motivation of taking up Part D. Thus, characteristics of beneficiaries who reported having CRN, especially those who continued to experience CRN after taking up Part D, need further studies.

MA4

COMPREHENSIVE ASSESSMENT OF PATIENT ADHERENCE TO DRUG THERAPY: AN EXAMPLE UTILIZING REAL WORLD DATA FOR AN ORAL MULTIPLE SCLEROSIS TREATMENT

Irwin DE[1], Cappell KA[2], Davis BM[2], Wu Y[3], Grinspan A[4], Gandhi SK[3]
[1]*Truven Health Analytics, Chapel Hill, NC, USA,* [2]*Truven Health Analytics, Ann Arbor, MI, USA,* [3]*TEVA Pharmaceuticals, Frazer, PA, USA,* [4]*TEVA Pharmaceuticals, Weston, FL, USA*

OBJECTIVES: Medication possession ratio (MPR) and persistence are typically used as measures of patients' drug use patterns. However, these measures may not capture all aspects related to real world dosing. We aim to explore additional approaches to enhance meaningful interpretation of patients' drug use patterns using persistence, adherence and average daily dose (ADD) data of dimethyl fumarate (DF) in a real world dataset. **METHODS:** A retrospective cohort study using the MarketScan Commercial and Medicare Databases (March 2013 – January 2014) was conducted in adult multiple sclerosis patients. Patients with DF claims who were continuously enrolled for at least 9 months before and after starting therapy were included (n=2,879). Outcomes included time to treatment non-persistence (switch to another disease modifying therapy (DMT) or drug discontinuation of ≥ 30 days), adherence (MPR and percent of days covered (PDC)), and estimated ADD. Data were interpreted in the context of the FDA approved daily dosing (240 mg b.i.d.), and an earlier trial (1) reporting dose-related MRI findings indicating non-significant effects on brain lesions for 360 mg/day and 120 mg/day doses. **RESULTS:** The mean (SD) DF treatment duration was 96 (66) days (median 83) and 24% of patients became non-persistent. Mean (SD) MPR and PDC were 0.83 (0.26) and 0.75 (0.29), respectively. ADD (SD) was 417 mg/day (221) with 15.3% treated at < 240 mg/day, 5.6% at 240-359 mg/day, 47.8% at 360-479 mg/day, and 31.3% at ≥ 480 mg/day (i.e., 20.9% treated at <360 mg/day and 68.7% treated at less than the labeled dose). **CONCLUSIONS:** The finding of a large proportion of patients receiving potentially sub-optimal treatment, as determined by ADD on DF, indicates significant potential clinical consequences for these patients. The approach used in this study could be used in other similar studies examining treatment adherence to enhance meaningful interpretation of adherence data. 1. Lancet 2008; 372(9618):1463-72.

MEDICAL DEVICE & DIAGNOSTIC RESEARCH STUDIES

MD1

ECONOMIC EVALUATION OF BST-CARGEL AS AN ADJUNCT TO MICROFRACTURE VERSUS MICROFRACTURE ALONE IN KNEE CARTILAGE SURGERY

Frappier J
Data 4 Actions, Blainville, QC, Canada

OBJECTIVES: Knee cartilage damage is a common cause of referral for orthopaedic surgery. Treatment aims to reduce pain and symptoms by repairing cartilage. Microfracture, the current standard of care, yields good short-term clinical outcomes; however, treatment might fail after 2-3 years. A Chitosan-Beta glycerolphosphate bioscaffold is used as an adjunct to microfracture and demonstrates improvements in quantity and quality of repaired tissue, potentially reducing the risk of treatment failure. This study aimed to establish the economic value of bioscaffold versus microfracture alone in knee cartilage repair from the societal perspective, using Germany as the reference market. **METHODS:** A decision tree with a 20-year time-horizon was constructed, in which undesirable clinical events were inferred following initial surgery. These events consisted of pain management, surgery and total knee replacement. Clinical outcomes were taken from the pivotal clinical trial, supplemented by other literature. Data and assumptions were validated by an internationally recognized Delphi panel. All relevant resource use and costs for procedures and events were considered. **RESULTS:** In a group of patients with all lesion sizes, the model inferred that bioscaffold yields a positive return on investment at year 4 (with 20-year cumulative cost savings of €6,448). Reducing the incremental risk of treatment failure gap between bioscaffold and microfracture by 25% to 50% does not alter this conclusion. Cost savings are greatest for patients with large lesions; Results for patients with small lesions are more modest. **CONCLUSIONS:** The Chitosan-Beta glycerolphosphate bioscaffold potentially represents a cost-saving alternative for patients with knee cartilage injury by reducing the risk of clinical events through regeneration of chondral tissue with hyaline characteristics. Since the burden of this condition is high, both to the patient and society, an effective and economically viable alternative is of importance.

MD2

COVERAGE LIMITS ON BLOOD GLUCOSE TEST STRIP REIMBURSEMENT FOR DIABETICS IN CANADA: UTILIZATION IMPACT FOR DIABETIC PATIENTS IN THE ONTARIO PUBLIC DRUG PROGRAM (OPDP)

Bosnic N[1], Goodfield JM[2], Robertson CM[2], Zhang Y[1]
[1]*IMS Brogan, Kanata, ON, Canada,* [2]*IMS Brogan, Mississauga, ON, Canada*

OBJECTIVES: In August 2013 the Ontario government implemented annual limits on the number of blood glucose test strips (BGTS) it will reimburse for people with diabetes. The change is based on research that shows BGTS have a limited clinical benefit for diabetes patients who do not require insulin. Under the Ontario Public Drug Programs (OPDP), these patients have a 200-400 strip/year limit, whereas patients who require insulin can receive up to 3,000 strips annually. The policy intent was not to change BGTS utilization for insulin patients; however, concerns exist around potential negative impacts on diabetes management. The objective of this analysis is to quantify the impact of this new BGTS utilization policy in Ontario across diabetes patients based on their diabetes treatment. **METHODS:** All patients who received BGTS coverage from the OPDP during July 2012 – September 2014 were selected for analysis using the IMS Brogan OPDP Database. Annual BGTS utilization prior to the policy change (July 2012 – June 2013) was then compared to annual BGTS utilization following Ontario's coverage limit (October 2013 - September 2014). Patients were categorized into one of four cohorts based on their diabetes medication history: 'insulin only',' insulin + oral anti-diabetic (OAD)', 'OAD', or 'neither'. Changes in utilization patterns were assessed for each cohort. **RESULTS:** 422,525 patients were identified for the pre-period, and 422,154 patients were identified for the post-period. Overall BGTS unit volume declined from 192M to 147M (-24%) following the OPDP policy change. On average, the number of BGTS per patient per year decreased for 'OAD ' and 'neither' cohorts by 42% and 54%, respectively. Impact to patients managing diabetes with insulin was minimal: 'insulin only' (-1%) and 'insulin + OAD' (-2%). **CONCLUSIONS:** BGTS utilization markedly decreased in diabetes patients not managed with insulin; test strip utilization was marginally impacted for patients using insulin.

MD3

ECONOMIC IMPACT OF CHANGES IN NICU VENTILATION STRATEGIES WITH THE ADVENT OF NEW NONINVASIVE VENTILATION TECHNIQUES: A REVIEW AND PROPOSED ASSESSMENT FRAMEWORK FOR HIGH FLOW THERAPY (HFT) AS A ROUTINE RESPIRATORY SUPPORT PARADIGM

Pietzsch JB[1], Garner AM[1], McQueen MC[2]
[1]*Wing Tech Inc., Menlo Park, CA, USA,* [2]*Banner Thunderbird Medical Center, Glendale, AZ, USA*

OBJECTIVES: High flow therapy (HFT) has been demonstrated to be a safe and effective noninvasive respiratory support technique for the treatment of pre-term infants in neonatal intensive care units (NICU). Our objective was to develop a quantitative framework based on available evidence to estimate the economic impact of adoption of a HFT respiratory support strategy compared to current standard of care. **METHODS:** We constructed a model to estimate total cost per NICU episode of care by treatment strategy, considering utilization and duration of the different types of ventilatory support modalities – conventional mechanical ventilation (CMV), nasal continuous positive airway pressure (nCPAP) ventilation, and HFT – as well as utilization levels of surfactant, chest x-rays, blood gas analyses and total NICU length of stay. Model parameters were derived from a recent study comparing respiratory modality utilization between five US-based neonatal intensive care units (NICUs) adopting a HFT strategy and a larger pool of NICUs in the Vermont-Oxford Network (VON), and from single center experience. We computed the total cost difference between the respiratory support strategies based on published cost data. Parameter uncertainty was tested in sensitivity analyses. **RESULTS:** The base case analysis resulted in total average length of ventilation of 25.48 days for the non-HFT strategy (8.92 days nCPAP, 6.10 days HFT, 10.47 days CMV) and of 25.06 days (2.88 days nCPAP, 16.86 days HFT, 5.32 days CMV) for the HFT strategy. HFT was associated with total projected cost savings of $2,317. Results were sensitive to length of HFT use, length of CMV, cost of HFT, and length of nCPAP support. **CONCLUSIONS:** Adoption of a HFT strategy appears to be associated with meaningful savings in total NICU episode of care costs, primarily resulting from reductions in the time of conventional mechanical ventilation. Further research is warranted to substantiate these findings.

MD4

ECONOMIC VALUE OF IMPROVED ACCURACY FOR SELF-MONITORING OF BLOOD GLUCOSE DEVICES FOR TYPE 1 DIABETES

McQueen RB[1], Breton M[2], Ott M[3], Koa H[4], Beamer B[4], Campbell JD[1]
[1]*University of Colorado Anschutz Medical Campus, Denver, CO, USA,* [2]*University of Virginia Health System, Charlottesville, CO, USA,* [3]*Bayer HealthCare, Leverkusen, Germany,* [4]*Bayer HealthCare, Etobicoke, ON, Canada*

OBJECTIVES: To simulate and compare clinical and economic outcomes of self-monitoring of blood glucose (SMBG) devices along accuracy ranges and strip price. **METHODS:** We programmed a long-term type 1 diabetes natural history and treatment cost-effectiveness model. In phase one, using In Silico modeling validated by the Food and Drug Administration, we associated changes in accuracy error rates of SMBG devices to changes in HbA1c (holding hypoglycemic rates unchanged) and changes in severe hypoglycemia rates requiring an inpatient stay (holding HbA1c levels unchanged). In phase two, using Markov cohort simulation modeling, we estimated lifetime clinical and economic outcomes from the Canadian payer perspective. The primary comparison was a SMBG device with strip price $0.73 Canadian dollars (CAD) with accuracy error rate of 10% versus a SMBG device with strip price $0.60 CAD with accuracy error rate of 15%. Outcomes for the average patient, discounted at 3% per annum, were quality-adjusted life years (QALYs), costs, incremental cost-effectiveness ratios (ICERs), and budget impact. **RESULTS:** Assuming the benefits translate into HbA1c improvements only, the ICER with accuracy error rate of 10% versus 15% was $11,500 CAD per QALY. Assuming the benefits translate into reduced severe hypoglycemic events that required an inpatient stay only, an SMBG device with accuracy error rate of 10% dominates (i.e., less costly, more effective) an SMBG device with accuracy error rate of 15%. Assuming SMBG errors only impact HbA1c improvements, and when varying all inputs simultaneously through a probabilistic sensitivity analysis, 91% of simulations were cost-effective at a willingness-to-pay of $100,000 per QALY. The five-year budget impact findings ranged from $0.0005 per member per month for HbA1c improvements to cost-savings for severe hypoglycemic event reductions. **CONCLUSIONS:** From the efficiency (cost-effectiveness) and affordability (budget impact) payer perspectives, reducing the error in SMBG devices appears to be an efficient and affordable strategy.